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FOREST INSECT CONDITIONS

in the Pacific Northwest during 1965

by

P.W. Orr
L.F. Pettinger
R.E. Dolph

INSECT AND DISEASE CONTROL BRANCH
DIVISION OF TIMBER MANAGEMENT
PACIFIC NORTHWEST REGION
U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE

APRIL 1966

453

This report, the 18th in an annual series, is based on cooperative aerial and ground surveys sponsored by the Northwest Forest Pest Action Council. The principal cooperators were the Washington State Department of Natural Resources, Oregon State Department of Forestry and U. S. Forest Service. Many individuals from these organizations made the surveys possible.

COVER BACKGROUND: Helicopters begin a dawn attack on the Douglas-fir tussock moth at Burns, Oregon.

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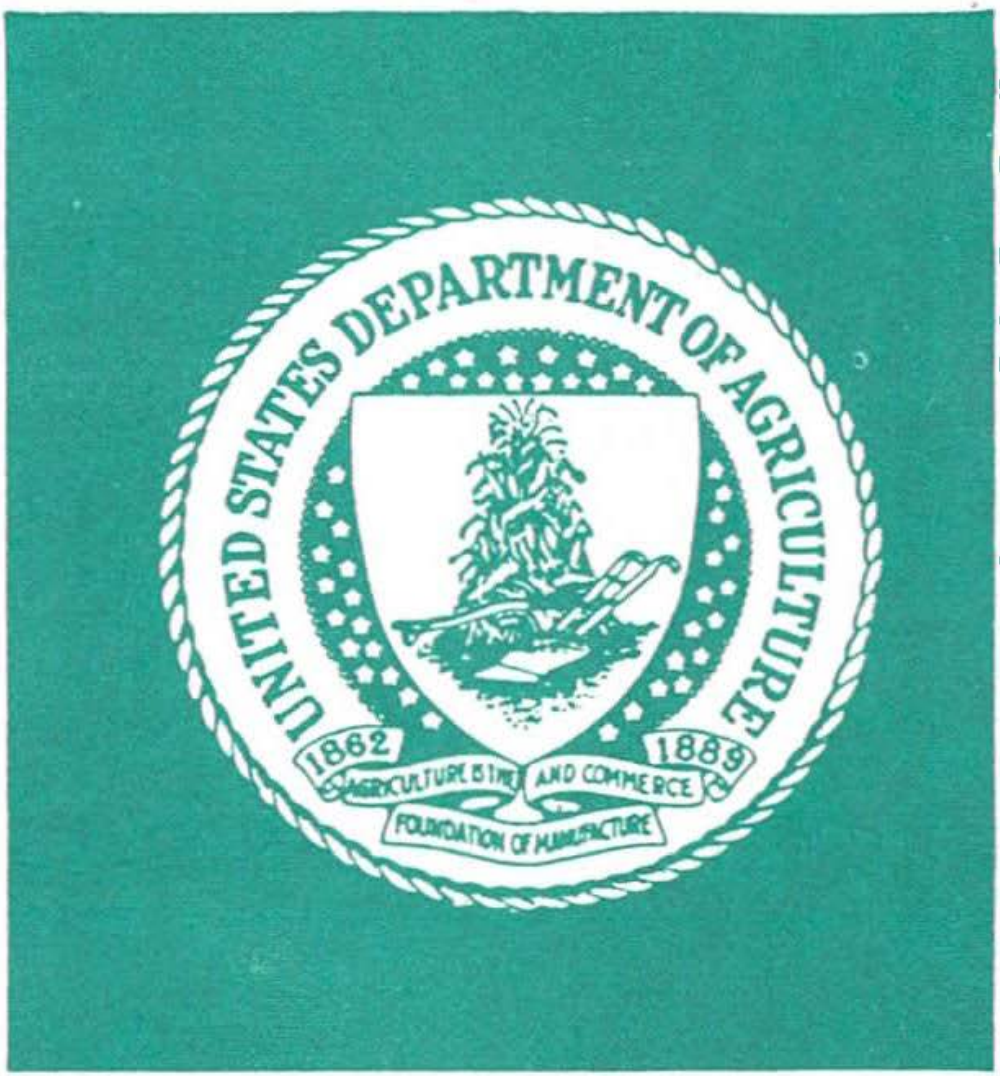

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March 1966

Insect and Disease Control Branch
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Pacific Northwest Region U. S. Forest Service

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SURVEY FINDINGS IN BRIEF

Insect outbreaks in Oregon and Washington occupied 1,403,300 acres, an increase over last year. The damage trend during the past decade is as follows:

Year	Acres infested	Year	Acres infested
1956	1,410,660	1961	1,223,230
1957	2,129,440	1962	1,305,170
1958	2,032,720	1963	1,319,120
1959	1,448,360	1964	1,208,570
1960	1,272,960	1965	1,403,300

The extent and intensity of outbreaks by insect species are given in table 40 for Oregon and in table 41 for Washington. The generalized location of the major outbreaks is shown in figure 2. Boundaries of individual forest insect survey reporting areas are shown on inside of back cover.

Main findings in 1965 were:

1. Mountain pine beetle.--Tree killing in western white pine decreased in both States. Outbreaks in ponderosa pine increased in both States. Infestations in lodgepole pine stands increased in Oregon and decreased in Washington. Infestations in knobcone pine increased in local areas in Oregon. Sugar pine losses remained static.

2. Douglas-fir beetle.--Beetle buildup following the 1962 storm killed about 2.6 billion board feet of timber--1.9 billion board feet in 1964 and 0.7 billion board feet in 1965. The trend for 1966 is downward Regionwide.

3. Western pine beetle.--The area of infestation was about the same as last year. Losses are likely to continue in most overmature pine stands in the Region.

4. Fir engraver.--Light, less severe losses occurred in both States.

5. Oregon pine ips.--Infestations increased slightly in immature ponderosa pine stands.

6. Engelmann spruce beetle.--Outbreaks expanded in both States.

7. Silver fir beetles.--Tree killing in Washington was more severe and extensive. No epidemic outbreaks occurred in Oregon.

8. Larch casebearer.--Infestations increased in extent and intensity in northeast Washington. The infestation is moving westward.

9. Larch sawfly.--A new outbreak developed in Washington and the ones in Oregon increased in size and intensity.

10. Douglas-fir tussock moth.--Outbreaks were brought under control by spraying and natural control factors. No defoliation is expected next year.

11. Pine needle miner.--A small outbreak on the Deschutes National Forest, Oregon intensified but no tree killing has occurred.

12. Western oak looper.--Outbreaks in the Willamette Valley of Oregon declined.

13. Spruce budworm.--No outbreaks were found this year.

14. European pine shoot moth.--Infested trees were found in a Christmas tree plantation outside the containment zone in western Washington. Three infested trees were intercepted at a new landscape planting in Portland, Oregon. Infested pines shipped to Klickitat and Sherman Creek Game Ranges in eastern Washington were found and destroyed before moth flight. No other infestations were found in communities outside the containment zone in Washington or Oregon.

15. Western hemlock looper.--The recent outbreak subsided.

16. Pandora moth.--Mature larvae pupated late in June. An "off" year adult flight also occurred in lodgepole pine near Chemult, Oregon. No serious damage is forecast.

17. Blackheaded budworm.--Light defoliation of true firs and Douglas-fir occurred on two areas of the Malheur National Forest, Oregon. An increase in defoliation is expected. No control is planned for 1966.

18. Balsam woolly aphid.--Infestations decreased in both Oregon and Washington.

19. Pine needle scale.--Infestations in lodgepole pine in eastern Oregon becomes more intensive.

20. Spruce aphid.--Damage to Sitka spruce in western Washington occurred in several areas. No control is planned for 1966.

Table 1.--Summary of 1966 forest insect epidemic infestations in Oregon and Washington

Insects 1/	Oregon		Washington		Regional total	
	Infestation centers	Area	Infestation centers	Area	Infestation centers	Area
	Number	Acres	Number	Acres	Number	Acres
Defoliators:						
Larch casebearer	0	0	98	340,380	98	340,380
Larch sawfly	8	16,940	2	4,640	10	21,580
Douglas-fir tussock moth	11	4,910	9	2,580	20	7,490
Pine needle miner	3	4,960	0	0	3	4,960
Western oak looper	3	720	0	0	3	720
All defoliators	25	27,530	109	347,600	134	375,130
Sucking insects:						
Balsam woolly aphid	316	46,420	68	20,820	384	67,240
Pine needle scale	1	4,640	0	0	1	4,640
Spruce aphid	0	0	2	960	2	960
All sucking insects	317	51,060	70	21,780	387	72,840
Bark beetles:						
Mountain pine beetle (W)	398	72,120	372	127,330	770	199,450
Mountain pine beetle (P)	472	109,620	81	31,930	553	141,550
Mountain pine beetle (L)	289	94,190	16	1,970	305	96,160
Mountain pine beetle (S)	50	6,110	0	0	50	6,110
Mountain pine beetle (K)	3	1,400	0	0	3	1,400
Douglas-fir beetle	2,385	220,860	211	34,970	2,596	255,830
Western pine beetle	663	104,600	93	24,920	756	129,520
Fir engraver	515	63,800	115	21,990	630	85,790
Oregon pine ips	196	16,000	21	3,100	217	19,100
Engelmann spruce beetle	58	7,410	15	3,770	73	11,180
Silver fir beetles	0	0	44	9,240	44	9,240
All bark beetles	5,029	696,110	968	259,220	5,997	955,330
All insects	5,371	774,700	1,147	628,600	6,518	1,403,300

1/ Mountain pine beetle infestations are separated by tree species attacked: W, western white pine; L, lodgepole pine P, ponderosa pine; S, sugar pine; K, knobcone pine.

INTRODUCTION

Epidemic infestations were detected and mapped from the air. Ground surveys included intensive biological evaluations of the Douglas-fir tussock moth and spruce budworm and routine checking to verify the accuracy of aerial mapping. Individual insects are discussed below according to the extent of their outbreaks and not necessarily according to their present or future potential.

The extent and trend of damage to trees caused by bears and the extent and trend of dying hemlock are discussed at the behest of the Northwest Forest Pest Action Council.

DEFOLIATORS

Standards used for classifying forest defoliator outbreaks are as follows:

Defoliation intensity	Appearance of damage
Light	Barely visible from air
Moderate	Top 1/4 of tree defoliated
Heavy	Top 1/2 of tree defoliated
Very heavy	Top 3/4 of tree defoliated

LARCH CASEBEARER
Coleophora laricella (Hübner)

Infestations increased in size and number throughout northeast Washington (table 2). Westward and northward spread of the moth has been rapid, with infestations being recorded as far north as the Canadian border and as far west as the west bank of the Columbia River on the Colville Indian Reservation (table 3). Centers of light to moderate defoliation were recorded over much of southwestern Stevens County, including the Spokane Indian Reservation. Sub-epidemic populations were observed over much of the Spokane Indian Reservation, but the most severe trouble spots were located in northern Spokane County and southern Pend Oreille and northeastern Stevens County (figure 1). Continued westward spread of this insect can be expected and will probably reach the Okanogan National Forest within the next year or two.

Although heavy defoliation has repeatedly occurred in some areas since 1962, no tree mortality has yet occurred.

Limited release of the larch casebearer parasite, *Agathis pumila*, is planned for the spring of 1966.

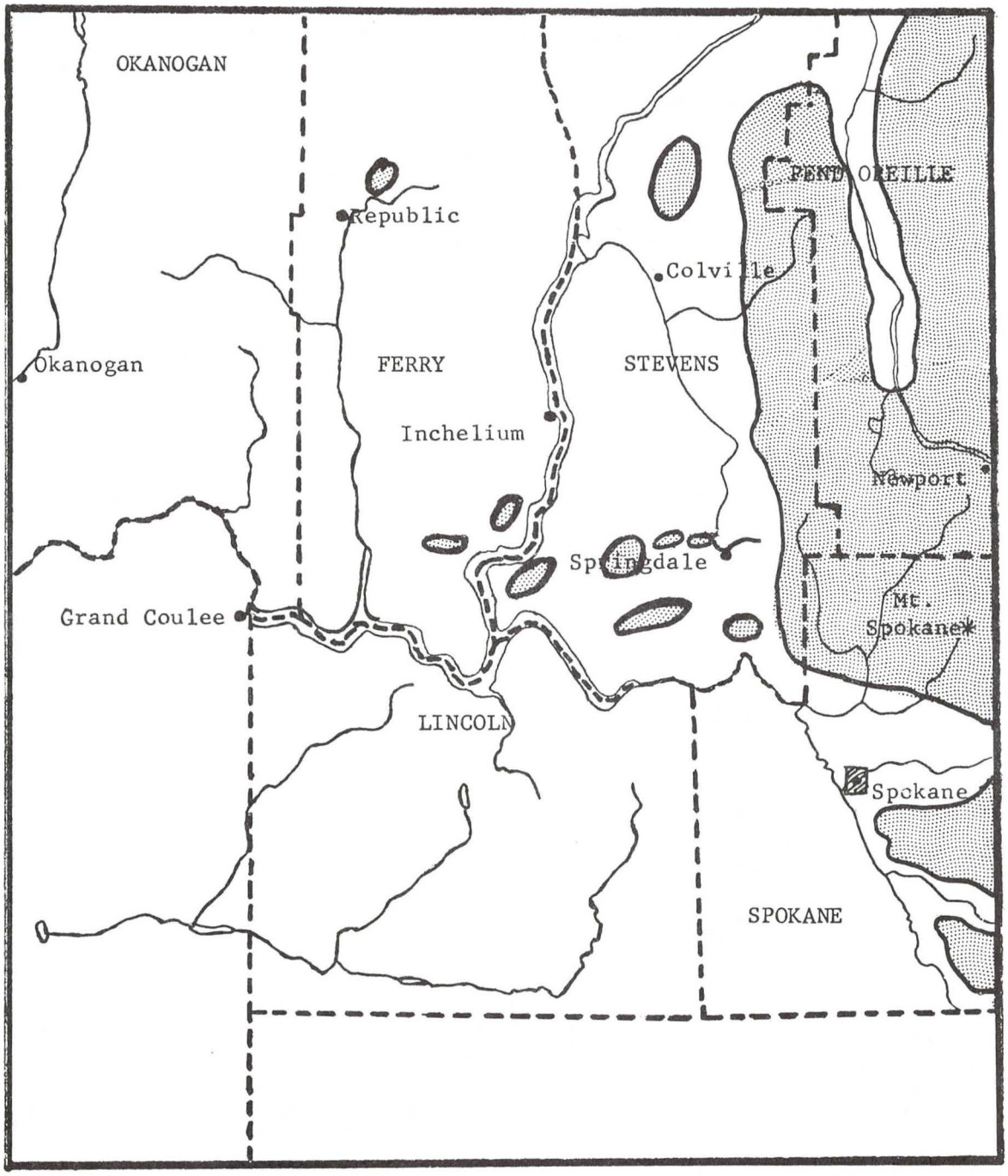

Figure 1.--Generalized area of larch casebearer in northeast Washington.

Table 2.--Trend of larch casebearer infestations in Washington, 1962-65

(In acres)

Reporting area 1/	Year			
	1962	1963	1964	1965
Kaniksu N.F.	0	6,270	30,180	167,480
Northeast Washington	5,280	30,760	82,530	151,160
Colville N.F.	0	0	200	17,180
Colville I.R.	0	0	0	1,120
Spokane I.R.	0	0	0	3,440
All areas	5,280	37,030	112,910	340,380

Table 3.--Extent of larch casebearer infestation in Washington in 1965, by reporting area and intensity of infestation

Reporting area 1/	Infestation centers	Intensity of infestation				All intensities
		Light	Moderate	Heavy	Very heavy	
	Number	Acres				
Washington:						
Kaniksu N.F.	10	88,340	50,390	22,070	6,680	167,480
Northeast Washington	53	102,610	27,150	14,660	6,740	151,160
Colville N.F.	32	9,870	5,490	1,820	0	17,180
Spokane I.R.	2	1,360	2,080	0	0	3,440
Colville I.R.	1	0	0	0	1,120	1,120
Washington areas	98	202,180	85,110	38,550	14,540	340,380
Regional total	98	202,180	85,110	38,550	14,540	340,380

1/ N.F., National Forest; I.R., Indian Reservation.

LARCH SAWFLY
Pristiphora erichsonni (Htg.)

Epidemic outbreaks of this insect in Oregon and Washington were confirmed for the first time this year. The unidentified sawfly defoliating larch stands on the Mt. Hood and Wallowa-Whitman National Forests in 1964 was probably this species also. The infestation recorded on the Mt. Hood National Forest has increased considerably in size, but decreased to sub-epidemic populations on the Wallowa-Whitman National Forest. Light to heavy defoliation occurred this year on the Warm Springs Indian Reservation in Oregon and on the Yakima Indian Reservation in Washington (table 4). Sub-epidemic populations were found on the Colville National Forest near Northport, Washington. This insect is expected to spread in both States.

Table 4.--Extent of larch sawfly in Oregon and Washington in 1965, by reporting area and intensity of infestation

Reporting area 1/	Infestation centers	Intensity of infestation: Light	Moderate	Heavy	Very heavy	All intensities
	Number	Acres				
Oregon:						
Mt. Hood N.F.	3	6,200	1,240	90	0	7,530
Warm Springs I.R.	5	5,710	2,740	960	0	9,410
Oregon areas	8	11,910	3,980	1,050	0	16,940
Washington:						
Yakima I.R.	2	4,320	0	320	0	4,640
Washington areas	2	4,320	0	320	0	4,640
Regional total	10	16,230	3,980	1,370	0	21,580

1/ N.F., National Forest; I.R., Indian Reservation.

DOUGLAS-FIR TUSSOCK MOTH
Hemerocampa pseudotsugata McD.

The trend of Douglas-fir tussock moth outbreaks was strongly downward in both Oregon and Washington (table 5). The sharp downward trend in Oregon was due to aerial spraying of 66,000 acres with DDT on the Malheur and Ochoco National Forests in 1965. Careful application of the insecticide by helicopter prevented damage to wildlife and other natural resources and gave 98% control of the tussock moth larval populations.

Two new centers of light to moderate defoliation developed on the Fremont National Forest in Oregon while no new infestations developed in Washington (table 6). Egg mass surveys show a definite downward trend in both States. Little or no tree killing is expected in either State. No control is planned in 1966.

Table 5.--Trend of Douglas-fir tussock moth infestations in Oregon and Washington, 1961-65

(In acres)

Reporting area	Year				
	1961	1962	1963	1964	1965
Oregon:					
Malheur N.F.	0	0	0	38,960	2,790
Ochoco N.F.	0	0	0	1,360	0
Fremont N.F.	0	0	0	0	2,120
Oregon areas	0	0	0	40,320	4,910
Washington:					
Northwest Washington	0	100	1,170	14,260	2,580
Colville N.F.	0	0	280	3,440	0
Kaniksu N.F.	0	0	65	0	0
Washington areas	0	100	1,515	17,700	2,580
Regional total	0	100	1,515	58,020	7,490

1/ N.F., National Forest.

Table 6.--Extent of Douglas-fir tussock moth infestations in Oregon and Washington in 1965, by reporting area and intensity of infestation

Reporting area[1/]	Infestation centers	Intensity of infestation: Light	Moderate	Heavy	Very heavy	All intensities
	Number	Acres				
Oregon:						
Malheur N.F.	9	2,170	420	200	0	2,790
Fremont N.F.	2	1,760	360	0	0	2,120
Oregon areas	11	3,930	780	200	0	4,910
Washington:						
Northeast Washington	9	820	660	1,100	0	2,580
Washington areas	9	820	660	1,100	0	2,580
Regional total	20	4,750	1,440	1,300	0	7,490

1/ N.F., National Forest.

PINE NEEDLE MINER
(Probably *Recurvaria* sp.)

Light to moderate defoliation of lodgepole pine occurred for the second year in Oregon near Crane Prairie Reservior on the Deschutes National Forest (table 8). The infested area has about doubled in the past year (table 7).

Tree killing has not yet occurred but repeated defoliation may have weakened the trees so they will become attractive to bark beetles.

Needle miner infestations were not found elsewhere in the Region.

Table 7.--Trend of needle miner infestations on lodgepole pine in Oregon, 1964-65

(In acres)

Year	Intensity of infestation				All intensities
	Light	Moderate	Heavy	Very heavy	
1964	0	2,800	0	0	2,800
1965	1,440	3,520	0	0	4,960

Table 8.--Extent of needle miner infestation in Oregon in 1965, by reporting area and intensity of infestation

Reporting area[1/]	Infestation centers	Intensity of infestation				All intensities
		Light	Moderate	Heavy	Very heavy	
	Number	Acres				
Oregon:						
Deschutes N.F.	3	1,440	3,520	0	0	4,960
Oregon areas	3	1,440	3,520	0	0	4,960
Regional total	3	1,440	3,520	0	0	4,960

1/ N.F., National Forest.

BLACKHEADED BUDWORM
Acleris variana (Fern.)

An epidemic outbreak developed in two centers in true fir and Douglas-fir stands on the Malheur National Forest, Oregon.

Intensity	Approximate acreage
Light defoliation	640
Heavy defoliation	3,200
Total	3,840

Elsewhere in eastern Oregon, larval populations were higher than normal.

Egg ratio surveys show that a much higher larval population may be available for feeding in 1966.

WESTERN OAK LOOPER
Lambdina fiscellaria somniaria (Hulst)

Outbreaks of this insect in Oregon declined sharply in 1965 (table 9). Light to moderate defoliation occurred in isolated oak stands in the Willamette Valley near Sheridan, Oregon (table 10). Diseases and parasites apparently caused the downward population trend over western Oregon.

Table 9.--Trend of western oak looper infestation in the Willamette Valley of Oregon, 1961-65

(In acres)

Year	Intensity of infestation				All intensities
	Light	Moderate	Heavy	Very heavy	
1961	0	5,760	960	160	6,880
1962	1,240	0	0	0	1,240
1963	6,120	3,990	4,760	1,880	16,750
1964	5,670	640	120	0	6,430
1965	80	640	0	0	720

Table 10.--Extent of western oak looper infestations in Oregon in 1965, by reporting area and intensity of infestation

Reporting area[1/]	Infestation centers	Intensity of infestation: Light	Moderate	Heavy	Very heavy	All intensities
	Number	Acres				
Oregon:						
Suislaw N.F.	3	80	640	0	0	720
Oregon areas	3	80	640	0	0	720
Regional total	3	80	640	0	0	720

1/ N.F., National Forest.

SPRUCE BUDWORM
Choristoneura fumiferana (Clem.)

For the first time since record keeping began in 1947, no outbreaks were detected in either State. Epidemic outbreaks of last year on the Colville and Kaniksu National Forests in Washington have declined (table 11). Egg mass evaluation surveys in past outbreak areas indicate no population buildups for 1966.

Table 11.--Trend of spruce budworm infestations in Oregon and Washington, 1961-65

(In acres)

Reporting area[1/]	Year				
	1961	1962	1963	1964	1965
Oregon:					
Fremont N.F.	55,200	42,060	37,040	0	0
Wallowa-Whitman N.F.	0	6,310	12,000	0	0
Oregon areas	55,200	48,370	49,040	0	0
Washington:					
Glenwood District	22,400	0	0	0	0
Yakima I.R.	7,200	0	0	0	0
Kaniksu N.F.	0	0	10,200	2,060	0
Colville N.F.	0	0	0	740	0
Washington areas	29,600	0	10,200	2,800	0
Regional totals	84,800	48,370	59,240	2,800	0

1/ N.F., National Forest; I.R., Indian Reservation.

WESTERN HEMLOCK LOOPER
Lambdina fiscellaria lugubrosa (Hulst)

No epidemic outbreaks of the hemlock looper were recorded in either Oregon or Washington this year (table 12). A few larvae and some sub-epidemic feeding occurred in southwestern Washington near the 1963 spray areas.

A moth flight occurred in a Clackamas River drainage in the Oregon Cascades this fall but no new eggs were found during an egg survey. Hence, no defoliation is expected in 1966.

Table 12.--Trend of western hemlock looper infestations in Northwest Oregon and Southwest Washington, 1961-65

(In acres)

Year	Area of epidemic infestations		Regional total
	Oregon	Washington	
1961	11,000	0	11,000
1962	1,060	5,990	7,050
1963	540	8,040	8,580
1964	0	650	650
1965	0	0	0

EUROPEAN PINE SHOOT MOTH
Rhyacionia buoliana (Schiff.)

In Washington, 88 communities were surveyed by the Washington State Department of Natural Resources outside the containment zone. Infestations were found in two Christmas tree plantations and four residences in Tumwater. Subsequently, the quarantine zone boundary has been adjusted to include all counties west of the Cascade crest excluding all of Wahkiakum, Cowlitz, Clark and Skamania Counties. Infested pines from one of these plantations were shipped early in 1965 to Klickitat and Sherman Creek Game Ranges in eastern Washington for landscape plantings around offices. All pines in the shipments were found and destroyed before moth flight.

In Oregon, no infestations were found during eradication surveys in residential areas of Portland and Salem. Three trees in a newly planted roadside landscaping along the Minnesota Freeway in North Portland were found to be infested with European pine shoot moth. The source of infested stock was traced to a private nursery near Olympia, Washington. The entire stock of ornamental pines from which the three infested trees came was removed and burned before moth flight. This was an interception, not an established infestation.

PANDORA MOTH
Coloradia pandora Blake

Light to moderate defoliation occurred in lodgepole pine on the Winema National Forest near Chemult, Oregon.

An off-year flight of moths was reported to have occurred the last of July. The main flight is expected this year. Some feeding is predicted for next year, but the population is expected to decrease because of fairly high parasitism of mature larvae in 1965.

A pilot test using Dibrom-14 was applied on 320 acres at rates of 5 ounces of concentrate diluted in 3 ounces of propylene glycol per acre on one plot of 160 acres and 5 ounces in one gallon of ethylene glycol per acre on the other 160-acre plot. The spray was against mature larvae. Results were not encouraging, but some larval mortality occurred.

BALSAM WOOLLY APHID
Adelges piceae (Ratz.)

Infested acreage decreased in Oregon and Washington (table 13). The majority of the damage occurred in the subalpine fir stands on the Gifford Pinchot and Snoqualmie National Forests in Washington. In Oregon, infestations were centered on the Mt. Hood, Willamette, Rogue River, Umpqua and Deschutes National Forests and in Crater Lake National Park. Infestations continued in grand fir near Coquille, Oregon (table 14).

No practical control measures have been developed for use under forest conditions. Logging of infested merchantable trees and those of declining thrift is about all that can be done.

Some limited insecticide field tests may be made against the aphid in 1966 on individual trees in high-use recreational areas in Washington.

Table 13.--Trend of balsam woolly aphid infestations in Oregon and Washington, 1961-65

(In acres)

Reporting area[1/]	Year				
	1961	1962	1963	1964	1965
Oregon:					
Willamette N.F.	68,640	33,920	44,710	72,760	19,430
Umpqua N.F.	6,880	4,280	11,830	17,960	4,320
Mt. Hood N.F.	1,760	5,840	9,870	17,660	7,530
Deschutes N.F.	800	4,000	19,640	17,320	5,260
Siuslaw N.F.	0	3,460	4,030	340	0
Winema N.F.	0	300	410	0	0
Rogue River N.F.	0	0	6,600	18,760	4,140
Warm Springs I.R.	0	0	3,380	1,380	1,750
Crater Lake N.P.	0	0	1,680	1,320	3,350
Coos-Douglas	0	0	0	520	640
Northwest Oregon	0	0	0	20	0
Oregon areas	78,080	51,800	102,150	148,040	46,420
Washington:					
Gifford Pinchot N.F.	2,080	2,590	63,930	25,860	11,040
Yakima I.R.	240	360	6,960	840	400
Southwest Washington	0	1,760	0	1,040	980
Snoqualmie N.F.	0	0	10,560	5,800	7,800
Mt. Rainier N.P.	0	0	3,260	1,120	360
Wenatchee N.F.	0	0	600	720	240
Washington areas	2,320	4,710	85,310	35,380	20,820
Regional total	80,400	56,510	187,460	183,420	67,240

1/ N.F., National Forest; I.R., Indian Reservation; N.P., National Park.

Table 14.--Extent of balsam woolly aphid infestations in Oregon and Washington in 1965, by reporting area and intensity of infestation

Reporting area[1/]	Infestation centers	Intensity of infestation: Light	Moderate	Heavy	Very heavy	All intensities
	Number	Acres				
Oregon:						
Willamette N.F.	115	13,510	4,740	1,180	0	19,430
Mt. Hood N.F.	50	7,370	160	0	0	7,530
Deschutes N.F.	61	4,860	400	0	0	5,260
Umpqua N.F.	25	3,440	800	80	0	4,320
Rogue River N.F.	27	3,290	770	80	0	4,140
Crater Lake N.P.	17	1,790	900	660	0	3,350
Warm Springs I.R.	16	1,230	520	0	0	1,750
Coos-Douglas	5	0	360	280	0	640
Oregon areas	316	35,490	8,650	2,280	0	46,420
Washington:						
Gifford Pinchot N.F.	36	8,910	1,980	150	0	11,040
Snoqualmie N.F.	24	4,480	1,080	1,280	960	7,800
Southwest Washington	3	980	0	0	0	980
Yakima I.R.	2	80	0	320	0	400
Mt. Rainier N.P.	2	120	0	240	0	360
Wenatchee N.F.	1	240	0	0	0	240
Washington areas	68	14,810	3,060	1,990	0	20,820
Regional total	384	50,300	11,710	4,270	960	67,240

1/ N.F., National Forest; I.R., Indian Reservation; N.P., National Park.

PINE NEEDLE SCALE
Phenacaspis pinifoliae (Fitch)

Moderate defoliation by the pine needle scale occurred on lodgepole pine near Wickiup Reservoir on the Deschutes National Forest (table 15). The infestation is quite widespread but below tree killing severity. No control is needed in 1966.

Table 15.--Extent of pine needle scale infestation in Oregon in 1965, by reporting area and intensity of infestation

Reporting area 1/	Infestation centers	Intensity of infestation: Light	Moderate	Heavy	Very heavy	All intensities
	Number	Acres				
Oregon:						
Deschutes N.F.	1	0	4,640	0	0	4,640
Oregon areas	1	0	4,640	0	0	4,640
Regional total	1	0	4,640	0	0	4,640

1/ N.F., National Forest.

SPRUCE APHID
Neomyzaphis abietina (Wlkr.)

The spruce aphid reappeared on Sitka spruce on the Olympic National Forest and Olympic National park (table 16). The damage was light and no tree mortality occurred. Outbreaks of this insect usually decline naturally within a year or two without causing any apparent damage to the stand.

Table 16.--Extent of spruce aphid infestations in Washington in 1965, by reporting area and intensity of infestation

Reporting area 1/	Infestation centers	Intensity of infestation: Light	Moderate	Heavy	Very heavy	All intensities
	Number	Acres				
Washington:						
Olympic N.F.	1	240	0	0	0	240
Olympic N.P.	1	720	0	0	0	720
Washington areas	2	960	0	0	0	960
Regional total	2	960	0	0	0	960

1/ N.F., National Forest; N.P., National Park.

MOUNTAIN PINE BEETLE
Dendroctonus ponderosae Hopk.

Regionwide, mountain pine beetle outbreaks in young ponderosa pine stands more than doubled the 1964 losses (table 17). Tree killing in the lodgepole pine stands increased in Oregon but decreased in Washington. Mortality in western white pine stands decreased slightly in both States. Some tree killing occurred in knobcone pine stands in Oregon. Sugar pine losses remained static. The situation by tree species is as follows:

Western white pine.--Outbreaks decreased in both Oregon and Washington. The heaviest losses occurred on the Wenatchee National Forest in Washington. Additional heavy losses were found on the Olympic National Park and the Gifford Pinchot and Snoqualmie National Forests. In Oregon, most of the mortality occurred on the Willamette and Mt. Hood National Forests (table 18).

Control is impractical in the Cascade Mountains because of the blister rust and the scattered occurrence of white pine. To reduce beetle populations and save timber values, salvaging merchantable beetle-infested trees and logging the intermingled merchantable green white pine is encouraged.

Ponderosa pine.--Tree killing in Oregon was heaviest on the Wallowa-Whitman, Malheur and Fremont National Forests. Significant losses also occurred on the Winema, Umatilla and Ochoco National Forests. In Washington, tree mortality was the heaviest on the Okanogan National Forest. Lighter losses were found on the Yakima Indian Reservation and Umatilla National Forest (table 19).

For control, stand manipulation by thinning is necessary to prevent future beetle outbreaks. Vigorous, well-spaced trees appear to be less susceptible to attack. Direct control is only a stopgap measure.

Lodgepole pine.--Tree killing in the lodgepole pine stands of Oregon increased considerably with the heaviest losses occurring on the Fremont, Winema, Deschutes and Malheur National Forests. Outbreaks in Washington decreased significantly with most of the losses occurring on the Yakima Indian Reservation and the Wenatchee and Okanogan National Forests (table 20).

Salvage logging of merchantable beetle-infested trees and adjacent green trees is recommended to reduce beetle population.

Sugar pine.--Light to moderate tree killing occurred in mature sugar pine stands of southern Oregon. Most of the losses reported occurred on the Siskiyou and Fremont National Forests (table 21).

Salvaging is recommended to reduce the beetle population and save timber values.

Knobcone pine.--Light losses occurred in a knobcone pine stand on the Umpqua National Forest (table 22). Previously, this stand had been severely defoliated for a three-year period by a sawfly Neodriprion fulviceps complex.

Table 17.--Trend of mountain pine beetle infestations in Oregon and Washington, by host species, 1961-65[1/]

(In acres)

Year of detection	Area of epidemic infestations							Regional tot., all species
	Oregon				Washington			
	W	L	P	S	W	L	P	
1961	114,380	77,680	16,640	0	291,760	1,520	1,200	503,180
1962	73,720	65,200	3,820	160	349,770	3,050	1,340	497,060
1963	67,845	50,220	32,220	0	410,540	17,620	1,160	579,605
1964	92,700	55,790	42,440	6,160	175,990	8,770	13,830	395,680
1965	72,120	94,190	109,620	6,110	127,330	1,970	31,930	443,270

1/ Host species are: W, western white pine; L, lodgepole pine; P, ponderosa pine; S, sugar pine.

Table 18.--Extent of mountain pine beetle infestations in western white pine in Oregon and Washington in 1965, by reporting area and intensity of infestation

Reporting area[1/]	Infestation centers	Intensity of infestation: Light	Moderate	Heavy	Very heavy	All intensities
	Number	Acres				
Oregon:						
Willamette N.F.	148	18,980	13,620	5,640	0	38,240
Mt. Hood N.F.	182	9,330	8,620	8,360	1,500	27,810
Umpqua N.F.	30	2,120	800	0	0	2,920
Siskiyou N.F.	10	720	960	0	0	1,680
Rogue River N.F.	17	640	280	0	0	920
Winema N.F.	3	240	0	0	0	240
Deschutes N.F.	4	140	90	0	0	230
Warm Springs I.R.	4	80	0	0	0	80
Oregon areas	398	32,250	24,370	14,000	1,500	72,120
Washington:						
Wenatchee N.F.	125	16,780	12,460	7,940	3,340	40,520
Olympic N.P.	71	16,040	8,540	1,680	680	26,940
Gifford Pinchot N.F.	31	10,140	2,550	100	80	12,870
Snoqualmie N.F.	56	5,380	5,260	1,080	240	11,960
Colville N.F.	13	2,920	620	5,460	280	9,280
Olympic N.F.	25	5,440	920	1,120	480	7,960
Quinault I.R.	4	4,920	400	0	0	5,320
Kaniksu N.F.	15	2,200	1,000	280	0	3,480
Yakima I.R.	5	480	2,320	0	120	2,920
Mt. Rainier N.P.	7	800	840	280	0	1,920
Mt. Baker N.F.	10	1,440	0	0	0	1,440
Glenwood District	2	600	560	0	0	1,160
Okanogan N.F.	6	480	360	0	0	840
Puget Sound District	2	0	560	160	0	720
Washington areas	372	67,620	36,390	18,100	5,220	127,330
Regional total	770	99,870	60,760	32,100	6,720	199,450

1/ N.F., National Forest; I.R., Indian Reservation; N.P., National Park.

Table 19.--Extent of mountain pine beetle infestations in ponderosa pine in Oregon and Washington in 1965, by reporting area and intensity of infestation

Reporting area[1/]	Infestation centers	Intensity of infestation: Light	Moderate	Heavy	Very heavy	All intensities
	Number	Acres				
Oregon:						
Wallowa-Whitman N.F.	134	28,290	8,920	7,570	3,630	48,410
Malhuer N.F.	106	21,300	5,610	2,260	0	29,170
Fremont N.F.	104	8,520	5,600	2,460	160	16,740
Winema N.F.	37	4,350	560	0	0	4,910
Umatilla N.F.	23	2,720	420	0	0	3,140
Deschutes N.F.	18	1,240	1,310	0	0	2,550
Ochoco N.F.	19	2,370	0	0	0	2,370
Siskiyou N.F.	11	1,290	0	0	0	1,290
Central Oregon Dist.	9	680	0	0	0	680
Rogue River N.F.	5	170	0	0	0	170
Umpqua N.F.	1	120	0	0	0	120
Mt. Hood N.F.	3	50	0	0	0	50
Umatilla I.R.	2	20	0	0	0	20
Oregon areas	472	71,120	22,420	12,290	3,790	109,620
Washington:						
Okanogan N.F.	31	3,540	6,480	3,900	1,480	15,400
Yakima I.R.	6	1,040	4,660	680	400	6,780
Umatilla N.F.	21	3,940	340	0	0	4,280
Colville N.F.	13	280	1,500	1,140	360	3,280
Colville I.R.	4	620	0	390	0	1,010
Wenatchee N.F.	3	160	180	240	0	580
Spokane I.R.	1	280	0	0	0	280
Snoqualmie N.F.	1	0	280	0	0	280
Glenwood Dist.	1	40	0	0	0	40
Washington areas	81	9,900	13,440	6,350	2,240	31,930
Regional total	553	81,020	35,860	18,640	6,030	141,550

1/ N.F., National Forest; I.R., Indian Reservation.

Table 20.--Extent of mountain pine beetle infestations in lodgepole pine in Oregon and Washington in 1965, by reporting area and intensity of infestation

Reporting area[1/]	Infestation centers	Intensity of infestation: Light	Moderate	Heavy	Very heavy	All intensities
	Number	Acres				
Oregon:						
Fremont N.F.	101	18,920	17,020	8,780	2,380	47,100
Winema N.F.	93	17,130	3,690	740	0	21,560
Deschutes N.F.	44	7,360	2,600	1,770	200	11,930
Malheur N.F.	25	4,780	2,240	1,390	0	8,410
Wallowa-Whitman N.F.	12	1,370	1,080	680	0	3,130
Crater Lake N.P.	9	1,000	800	0	0	1,800
Umatilla N.F.	3	140	0	0	0	140
Siskiyou N.F.	1	80	0	0	0	80
Ochoco N.F.	1	40	0	0	0	40
Oregon areas	289	50,820	27,430	13,360	2,580	94,190
Washington:						
Wenatchee N.F.	7	640	100	100	0	840
Yakima I.R.	2	560	0	0	0	560
Okanogan N.F.	5	200	120	120	0	440
Olympic N.F.	1	80	0	0	0	80
Umatilla N.F.	1	50	0	0	0	50
Washington areas	16	1,530	220	220	0	1,970
Regional total	305	52,350	27,650	13,580	2,580	96,160

1/ N.F., National Forest; I.R., Indian Reservation; N.P., National Park.

Table 21.--Extent of mountain pine beetle infestations in sugar pine in Oregon in 1965, by area and intensity of infestation

Reporting area[1/]	Infestation centers	Intensity of infestation: Light	Moderate	Heavy	Very heavy	All intensities
	Number	Acres				
Oregon:						
Siskiyou N.F.	37	3,750	360	0	0	4,110
Fremont N.F.	6	1,640	0	0	0	1,640
Coos-Douglas Dist.	2	160	0	0	0	160
Rogue River N.F.	3	130	0	0	0	130
Deschutes N.F.	1	50	0	0	0	50
Winema N.F.	1	20	0	0	0	20
Oregon areas	50	5,750	360	0	0	6,110
Regional total	50	5,750	360	0	0	6,110

1/ N.F., National Forest.

Table 22.--Extent of mountain pine beetle infestations in knobcone pine in Oregon in 1965, by area and intensity of infestation

Reporting area[1/]	Infestation centers	Intensity of infestation: Light	Moderate	Heavy	Very heavy	All intensities
	Number	Acres				
Oregon:						
Umpqua N.F.	3	1,400	0	0	0	1,400
Oregon areas	3	1,400	0	0	0	1,400
Regional total	3	1,400	0	0	0	1,400

1/ N.F., National Forest.

DOUGLAS-FIR BEETLE
Dendroctonus pseudotsugae Hopk.

Douglas-fir beetle damage nearly doubled that reported in 1964 (table 23). In western Oregon the most severe outbreaks occurred primarily on private and O&C lands in Coos and Douglas Counties. Losses were also high on the Siuslaw, Umpqua, Willamette and Rogue River National Forests. Although heavy damage in eastern Oregon remained on the Wallowa-Whitman National Forest, there was a significant reduction when compared to 1964 losses. In eastern Washington, tree mortality was heaviest on the Okanogan and Colville National Forests. Lighter losses occurred in western Washington on Southwest Washington State District and the Gifford Pinchot and Snoqualmie National Forests (table 24).

A combination photo-ground survey showed that losses sustained in western Oregon alone during 1964 and 1965 totalled 2.6 billion board feet. Of this 1.9 billion board feet occurred in 1964 and 0.7 billion board feet in 1965.

Although losses will continue to be high, a general downward trend is expected in 1966. Removal of infested trees and recent blowdown is essential to reduce the beetle population and the deterioration of the timber.

Table 23.--Trend of Douglas-fir beetle infestations in Oregon and Washington, 1961-65

(In acres)

Reporting area[1/]	Year				
	1961	1962	1963	1964	1965
Oregon:					
Coos-Douglas Dist.	0	0	0	19,630	69,720
Siuslaw N.F.	800	1,560	540	17,890	54,080
Umpqua N.F.	320	740	4,100	2,360	30,260
Willamette N.F.	0	0	410	720	17,850
Siskiyou N.F.	1,200	1,160	320	6,760	15,200
Rogue River N.F.	9,360	3,040	3,560	240	2,580
Northwest Oregon Dist.	0	0	0	0	1,400
Mt. Hood N.F.	960	600	0	450	400
Wallowa-Whitman N.F.	32,640	12,490	12,510	52,220	20,710
Umatilla N.F.	24,480	5,630	1,560	10,640	1,900
Malheur N.F.	320	520	240	810	6,160
Winema N.F.	40	0	210	0	0
Ochoco N.F.	0	650	860	470	550
Warm Springs I.R.	0	60	20	0	50
Umatilla I.R.	0	80	80	0	0
Central Oregon Dist.	0	0	110	0	0
Crater Lake N.P.	0	0	30	0	0
Oregon areas	70,120	26,530	24,550	112,190	220,860
Washington:					
Southwest Washington Dist.	160	320	0	0	3,680
Gifford Pinchot N.F.	9,440	2,550	1,880	460	2,930
Snoqualmie N.F.	160	1,800	850	230	2,260
Puget Sound Dist.	0	0	0	0	440
Olympic N.F.	0	0	120	0	440
Olympic N.P.	0	0	320	80	80
Northwest Washington	960	0	0	0	40
Colville I.R.	20,600	7,650	11,460	2,050	2,300
Spokane I.R.	40	0	70	0	0
Mt. Baker N.F.	200	0	400	0	160
Yakima I.R.	0	0	320	0	0
Okanogan N.F.	49,460	24,060	31,950	6,830	12,160
Colville N.F.	11,720	14,900	8,240	4,630	8,780
Wenatchee N.F.	2,240	4,080	4,280	760	1,120
Glenwood Dist.	480	0	90	0	280
Kaniksu N.F.	1,880	220	160	360	180
Northeast Washington Dist.	0	80	60	0	120
Umatilla N.F.	1,800	330	500	2,710	0
Washington areas	99,140	55,990	60,700	18,110	34,970
Regional total	169,260	82,520	85,250	130,300	255,830

1/ N.F., National Forest; N.P., National Park; I.R., Indian Reservation.

Table 24.--Extent of Douglas-fir beetle infestations in Oregon and Washington in 1965, by reporting area and intensity of infestation

Reporting area[1/]	Infestation centers	Intensity of infestation: Light	Moderate	Heavy	Very heavy	All intensities
	Number	Acres				
Oregon (Westside):						
Coos-Douglas Dist.	664	29,080	21,680	17,040	1,920	69,720
Siuslaw N.F.	568	27,210	15,070	11,400	400	54,080
Umpqua N.F.	374	23,180	5,520	1,560	0	30,260
Willamette N.F.	197	15,320	1,570	960	0	17,850
Siskiyou N.F.	208	10,270	3,890	1,040	0	15,200
Rogue River N.F.	55	2,370	210	0	0	2,580
Northwest Oregon Dist.	16	1,400	0	0	0	1,400
Mt. Hood N.F.	11	400	0	0	0	400
Westside Oregon areas	2,093	109,230	47,940	32,000	2,320	191,490
Oregon (Eastside):						
Wallowa-Whitman N.F.	215	18,520	2,110	80	0	20,710
Malheur N.F.	49	5,760	400	0	0	6,160
Umatilla N.F.	21	1,900	0	0	0	1,900
Ochoco N.F.	4	550	0	0	0	550
Warm Springs I.R.	3	50	0	0	0	50
Eastside Oregon areas	292	26,780	2,510	80	0	29,370
All Oregon areas	2,385	136,010	50,450	32,080	2,320	220,860
Washington (Westside):						
Southwest Washington Dist.	30	2,640	880	0	160	3,680
Gifford-Pinchot N.F.	9	2,710	220	0	0	2,930
Snoqualmie N.F.	19	930	810	520	0	2,260
Olympic N.F.	6	440	0	0	0	440
Puget Sound Dist.	3	440	0	0	0	440
Mt. Baker N.F.	3	160	0	0	0	160
Olympic N.P.	1	80	0	0	0	80
Northwest Washington Dist.	1	40	0	0	0	40
Westside Washington areas	72	7,440	1,910	520	160	10,030
Washington (Eastside):						
Okanogan N.F.	58	7,720	3,080	1,360	0	12,160
Colville N.F.	52	5,600	2,520	420	240	8,780
Colville I.R.	12	2,040	260	0	0	2,300
Wenatchee N.F.	10	1,120	0	0	0	1,120
Glenwood Dist.	4	280	0	0	0	280
Kaniksu N.F.	2	80	0	100	0	180
Northeast Washington Dist.	1	120	0	0	0	120
Eastside Washington areas	139	16,960	5,860	1,880	240	24,940
All Washington areas	211	24,400	7,770	2,400	400	34,970
Regional total	2,596	160,410	58,220	34,480	2,720	255,830

1/ N.F., National Forest; I.R., Indian Reservation; N.P., National Park.

WESTERN PINE BEETLE
Dendroctonus brevicomis Lec.

Western pine beetle outbreaks remained static (table 25). In Oregon, the majority of losses occurred on the Malheur, Fremont, Ochoco and Winema National Forests. Lighter tree mortality occurred on the Wallowa-Whitman, Umatilla and Deschutes National Forests. Losses in Washington were found primarily on the Yakima Indian Reservation and Wenatchee National Forest (table 26). Elsewhere in the pine region of both States tree killing was fairly light.

Losses caused by this beetle can be reduced or held to a minimum by continuing aggressive sanitation-salvage logging programs in all high-risk stands. Until the high-risk elements are removed, losses are likely to continue in uncut stands.

Table 25.--Trend of western pine beetle infestations in Oregon and Washington, 1961-65

(In acres)

Reporting area[1/]	Year				
	1961	1962	1963	1964	1965
Oregon:					
Umatilla I.R.	0	0	50	0	0
Malheur N.F.	32,720	71,660	14,790	42,180	26,770
Fremont N.F.	41,400	99,010	43,900	15,990	30,760
Ochoco N.F.	57,280	119,010	5,040	16,870	14,760
Winema N.F.	2,800	14,360	13,160	9,960	11,710
Wallowa-Whitman N.F.	2,600	1,250	4,510	5,480	6,410
Umatilla N.F.	9,920	18,770	5,070	8,170	4,880
Deschutes N.F.	5,920	30,380	2,950	5,010	4,780
Warm Springs I.R.	5,880	19,240	480	440	1,480
Siskiyou N.F.	1,760	960	130	3,120	1,350
Rogue River N.F.	19,160	14,320	4,430	1,180	1,200
Central Oregon Dist.	0	0	730	0	440
Mt. Hood N.F.	440	2,640	1,530	0	60
Umpqua N.F.	160	160	1,260	740	0
Crater Lake N.P.	0	620	0	0	0
Willamette N.F.	0	0	360	0	0
Coos-Douglas Dist.	0	0	0	2,170	0
Oregon areas	180,040	392,380	98,390	111,310	104,600
Washington:					
Umatilla N.F.	0	110	80	510	0
Yakima I.R.	9,040	2,680	9,560	10,480	7,320
Wenatchee N.F.	960	0	6,890	1,740	5,160
Okanogan N.F.	480	340	7,500	3,810	3,640
Colville I.R.	280	940	320	2,120	3,360
Colville N.F.	0	0	2,160	920	1,760
Spokane I.R.	0	0	0	1,280	1,280
Snoqualmie N.F.	800	30	0	0	1,180
Glenwood Dist.	40	200	8,860	840	940
Northwest Washington Dist.	0	360	60	0	280
Gifford Pinchot N.F.	1,160	1,720	3,840	2,400	0
Washington areas	12,760	6,380	39,270	24,100	24,920
Regional total	192,800	398,760	137,660	135,410	129,520

1/ N.F., National Forest; N.P., National Park; I.R., Indian Reservation.

Table 26.--Extent of western pine beetle infestations in Oregon and Washington in 1965, by reporting area and intensity of infestation

Reporting area[1/]	Infestation centers	Intensity of infestation				All intensities
		Light	Moderate	Heavy	Very heavy	
	Number	Acres				
Oregon:						
Malheur N.F.	183	23,340	3,310	120	0	26,770
Fremont N.F.	119	20,000	7,100	3,660	0	30,760
Ochoco N.F.	89	14,760	0	0	0	14,760
Winema N.F.	82	10,850	480	380	0	11,710
Wallowa-Whitman N.F.	57	6,410	0	0	0	6,410
Umatilla N.F.	44	4,430	450	0	0	4,880
Deschutes N.F.	47	4,510	270	0	0	4,780
Warm Springs I.R.	9	1,480	0	0	0	1,480
Siskiyou N.F.	8	1,350	0	0	0	1,350
Rogue River N.F.	15	1,160	40	0	0	1,200
Central Oregon Dist.	7	440	0	0	0	440
Mt. Hood N.F.	3	60	0	0	0	60
Oregon areas	663	88,790	11,650	4,160	0	104,600
Washington:						
Yakima I.R.	21	6,520	800	0	0	7,320
Wenatchee N.F.	17	4,200	960	0	0	5,160
Okanogan N.F.	18	3,320	320	0	0	3,640
Colville I.R.	10	3,080	280	0	0	3,360
Colville N.F.	6	1,760	0	0	0	1,760
Spokane I.R.	5	1,280	0	0	0	1,280
Snoqualmie N.F.	6	580	600	0	0	1,180
Glenwood Dist.	7	940	0	0	0	940
Northeast Washington Dist.	3	200	80	0	0	280
Washington areas	93	21,880	3,040	0	0	24,920
Regional total	756	110,670	14,690	4,160	0	129,520

1/ N.F., National Forest; I.R., Indian Reservation.

FIR ENGRAVER
Scolytus ventralis Lec.

The area infested by the fir engraver increased slightly in Washington and decreased considerably in Oregon resulting in an overall downward trend (table 27). Most of the losses in Washington occurred on the Umatilla National Forest. Although there was a significant decrease in Oregon, the heaviest losses in the Pacific Northwest occurred on the Umatilla and Wallowa-Whitman National Forests. Significant losses also occurred on the Ochoco National Forest (table 28). Most of the damage reported occurred in defective overmature trees and low value stands at high elevations. Because this beetle will attack some trees and produce broods without killing the tree, control under forest conditions is impractical. These attacks, however, kill strips of cambium and often introduce decay organisms that result in a lower quality of lumber. Salvage of merchantable infested trees is recommended to recover timber values that would otherwise be lost.

Table 27.--Trend of fir engraver infestations in Oregon and Washington, 1961-65

(In acres)

Reporting area[1/]	Year				
	1961	1962	1963	1964	1965
Oregon:					
Umatilla N.F.	7,280	41,770	8,660	24,040	22,200
Wallowa-Whitman N.F.	6,560	11,890	8,370	36,120	19,310
Ochoco N.F.	5,360	11,320	1,840	9,930	8,770
Malheur N.F.	1,760	3,200	1,810	5,090	5,400
Fremont N.F.	6,040	18,740	33,110	39,050	5,260
Umatilla I.R.	0	700	0	180	530
Winema N.F.	3,520	3,120	1,040	3,400	1,570
Mt. Hood N.F.	560	920	620	120	270
Rogue River N.F.	7,040	10,840	80	1,170	270
Central Oregon Dist.	0	0	1,580	710	150
Deschutes N.F.	480	950	430	290	60
Crater Lake N.P.	480	80	30	40	10
Umpqua N.F.	960	760	0	0	0
Willamette N.F.	3,200	1,000	660	0	0
Warm Springs I.R.	160	160	50	0	0
Lookout Mt.	320	0	0	480	0
Steens Mt.	0	0	0	200	0
Oregon areas	43,720	105,450	58,280	120,820	63,800
Washington:					
Umatilla N.F.	800	3,990	3,610	4,000	11,880
Wenatchee N.F.	1,600	680	5,040	2,860	3,340
Okanogan N.F.	5,360	1,180	4,190	3,510	3,200
Colville N.F.	160	2,950	880	490	2,580
Colville I.R.	0	0	0	80	490
Kaniksu N.F.	1,280	2,800	0	2,840	280
Gifford Pinchot N.F.	0	3,400	160	0	100
Spokane I.R.	0	0	0	0	0
Northeast Washington Dist.	1,440	280	0	0	0
Mt. Baker N.F.	3,040	1,540	940	280	0
Olympic N.F.	160	0	0	0	0
Olympic N.P.	1,280	0	0	0	0
Snoqualmie N.F.	480	5,480	880	840	0
Yakima I.R.	1,960	400	160	320	120
Glenwood Dist.	240	120	0	0	0
Washington areas	17,800	22,820	15,860	15,220	21,990
Regional total	61,520	128,270	74,140	136,040	85,790

1/ N.F., National Forest; N.P., National Park; I.R., Indian Reservation.

Table 28.--Extent of fir engraver beetle infestations in Oregon and Washington in 1965, by reporting area and intensity of infestation

Reporting area[1/]	Infestation centers	Intensity of infestation: Light	Moderate	Heavy	Very heavy	All intensities
	Number	Acres				
Oregon:						
Umatilla N.F.	176	19,290	2,910	0	0	22,200
Wallowa-Whitman N.F.	160	16,060	3,250	0	0	19,310
Ochoco N.F.	51	5,790	2,980	0	0	8,770
Malheur N.F.	57	5,070	330	0	0	5,400
Fremont N.F.	22	2,680	1,820	760	0	5,260
Winema N.F.	19	1,450	120	0	0	1,570
Umatilla I.R.	5	530	0	0	0	530
Mt. Hood N.F.	8	270	0	0	0	270
Rogue River N.F.	7	270	0	0	0	270
Central Oregon Dist.	6	110	40	0	0	150
Deschutes N.F.	3	60	0	0	0	60
Crater Lake N.P.	1	10	0	0	0	10
	515	51,590	11,450	760	0	63,800
Washington:						
Umatilla N.F.	58	9,850	1,470	560	0	11,880
Wenatchee N.F.	21	2,560	780	0	0	3,340
Okanogan N.F.	14	1,640	920	440	200	3,200
Colville N.F.	15	1,840	740	0	0	2,580
Colville I.R.	3	210	280	0	0	490
Kaniksu N.F.	2	160	120	0	0	280
Yakima I.R.	1	120	0	0	0	120
Gifford Pinchot N.F.	1	0	0	100	0	100
Washington areas	115	16,380	4,310	1,100	200	21,990
Regional total	630	67,970	15,760	1,860	200	85,790

1/ N.F., National Forest; I.R., Indian Reservation; N.P., National Park.

OREGON PINE IPS
Ips pini Say

Oregon pine ips outbreaks in Oregon increased substantially, while in Washington only a slight increase occurred (table 29). The heaviest losses in Oregon were found on or near the Malheur, Wallowa-Whitman, Ochoco and Winema National Forests. Most losses in Washington were situated on the Okanogan and Wenatchee National Forests (table 30). Elsewhere, tree killing was light in the pine region.

No control is needed in 1966. Good management practices usually preclude the need for direct control measures.

Table 29.--Trend of Oregon pine ips infestations in Oregon and Washington, 1961-65

(In acres)

Reporting area 1/	Year				
	1961	1962	1963	1964	1965
Oregon:					
Malheur N.F.	2,240	16,960	5,150	2,200	4,360
Wallowa-Whitman N.F.	2,680	13,580	3,410	40	3,820
Ochoco N.F.	0	3,090	220	740	3,730
Winema N.F.	0	360	1,790	1,820	1,780
Deschutes N.F.	0	0	330	150	950
Rogue River N.F.	5,920	2,240	250	880	420
Siskiyou N.F.	3,360	2,200	80	0	270
Fremont N.F.	160	1,740	1,890	540	170
Central Oregon Dist.	0	0	230	0	160
Warm Springs I.R.	0	0	190	0	130
Umatilla N.F.	1,520	3,130	1,470	0	30
Umatilla I.R.	0	110	0	0	110
Mt. Hood N.F.	0	200	570	1,000	70
Oregon areas	15,880	43,610	15,580	7,370	16,000
Washington:					
Okanogan N.F.	0	30	590	0	800
Wenatchee N.F.	0	0	0	160	740
Yakima I.R.	0	0	1,160	0	560
Colville I.R.	320	110	0	740	320
Spokane I.R.	240	10	0	200	320
Northeast Washington Dist.	5,560	400	0	0	160
Glenwood Dist.	40	20	130	520	60
Colville N.F.	40	100	200	330	140
Kaniksu N.F.	360	140	0	0	0
Umatilla N.F.	1,000	1,160	520	120	0
Snoqualmie N.F.	0	0	0	10	0
Washington areas	7,560	1,970	2,600	2,080	3,100
Regional total	23,440	45,580	18,180	9,450	19,100

1/ N.F., National Forest; I.R., Indian Reservation.

Table 30.--Extent of Oregon pine ips infestations in Oregon and Washington in 1965, by reporting area and intensity of infestation

Reporting area[1/]	Infestation centers	Intensity of infestation: Light	Moderate	Heavy	Very heavy	All intensities
	Number	Acres				
Oregon:						
Malheur N.F.	37	2,240	1,880	240	0	4,360
Wallowa-Whitman N.F.	36	3,060	240	520	0	3,820
Ochoco N.F.	40	3,360	230	140	0	3,730
Winema N.F.	25	1,260	520	0	0	1,780
Deschutes N.F.	17	470	480	0	0	950
Rogue River N.F.	9	420	0	0	0	420
Siskiyou N.F.	5	270	0	0	0	270
Fremont N.F.	5	170	0	0	0	170
Central Oregon Dist.	4	160	0	0	0	160
Warm Springs I.R.	6	90	40	0	0	130
Umatilla N.F.	4	110	0	0	0	110
Mt. Hood N.F.	7	40	30	0	0	70
Umatilla I.R.	1	30	0	0	0	30
Oregon areas	196	11,680	3,420	900	0	16,000
Washington:						
Okanogan N.F.	7	440	360	0	0	800
Wenatchee N.F.	2	0	340	0	400	740
Yakima I.R.	1	0	560	0	0	560
Colville I.R.	4	80	160	80	0	320
Spokane I.R.	1	320	0	0	0	320
Northeast Washington Dist.	3	160	0	0	0	160
Colville N.F.	2	40	100	0	0	140
Glenwood Dist.	1	60	0	0	0	60
Washington areas	21	1,100	1,520	80	400	3,100
Regional total	217	12,780	4,940	980	400	19,100

1/ N.F., National Forest; I.R., Indian Reservation.

ENGELMANN SPRUCE BEETLE
Dendroctonus obesus (Mann.)

Engelmann spruce beetle outbreaks increased substantially in both States (table 31). The heaviest losses in Oregon were found on the Wallowa-Whitman National Forest. Lighter damage occurred on the Umatilla National Forest. In Washington, the largest infestations occurred on the Wenatchee National Forest. Tree mortality also occurred on the Okanogan and Umatilla National Forests (table 32). In most cases these outbreaks are located in inaccessible areas and in small isolated patches where logging is not economical. In accessible areas, salvaging of infested merchantable trees and recent windthrown trees is recommended.

Table 31.--Trend of Engelmann spruce beetle infestations in Oregon and Washington, 1961-65

(In acres)

Reporting area 1/	Year				
	1961	1962	1963	1964	1965
Oregon:					
Wallowa-Whitman N.F.	2,560	130	2,690	2,760	7,220
Umatilla N.F.	0	860	1,420	840	190
Willamette N.F.	0	240	0	0	0
Oregon areas	2,560	1,230	4,110	3,600	7,410
Washington:					
Kaniksu N.F.	80	260	0	0	0
Wenatchee N.F.	1,360	120	600	0	3,080
Okanogan N.F.	840	480	4,890	280	380
Umatilla N.F.	0	4,180	4,040	320	310
Snoqualmie N.F.	1,280	400	1,480	0	0
Colville I.R.	640	80	0	0	0
Colville N.F.	800	80	0	0	0
Yakima I.R.	0	680	0	0	0
Washington areas	5,000	6,280	11,010	600	3,770
Regional total	7,560	7,510	15,120	4,200	11,180

1/ N.F., National Forest; I.R., Indian Reservation.

Table 32.--Extent of Engelmann spruce beetle infestations in Oregon and Washington in 1965, by reporting area and intensity of infestation

Reporting area[1/]	Infestation centers	Intensity of infestation: Light	Moderate	Heavy	Very heavy	All intensities
	Number	Acres				
Oregon:						
Wallowa-Whitman N.F.	53	5,860	1,080	280	0	7,220
Umatilla N.F.	5	190	0	0	0	190
Oregon areas	58	6,050	1,080	280	0	7,410
Washington:						
Wenatchee N.F.	8	3,080	0	0	0	3,080
Okanogan N.F.	2	60	320	0	0	380
Umatilla N.F.	5	310	0	0	0	310
Washington areas	15	3,450	320	0	0	3,770
Regional total	73	9,500	1,400	280	0	11,180

1/ N.F., National Forest.

SILVER FIR BEETLES
Pseudohylesinus spp.

Losses in Washington were significantly higher with the most severe and extensive tree killing on the Mt. Baker, Olympic and Snoqualmie National Forests (table 33). For the third consecutive year no outbreaks of silver fir beetles were found in Oregon (table 34). Scattered single trees were killed in many true fir stands in Washington.

No control other than removal of merchantable infested trees is recommended for 1966.

Table 33.--Trend of silver fir beetles infestations in Oregon and Washington, 1961-65

(In acres)

Reporting area[1/]	Year				
	1961	1962	1963	1964	1965
Oregon:					
Siuslaw N.F.	0	480	0	0	0
Northwest Oregon Dist.	480	0	0	0	0
Oregon areas	480	480	0	0	0
Washington:					
Mt. Baker N.F.	0	0	51,120	520	5,660
Olympic N.F.	0	0	0	0	1,440
Olympic N.P.	0	0	0	150	920
Snoqualmie N.F.	3,040	0	3,360	560	1,260
Gifford Pinchot N.F.	0	0	200	0	0
Mt. Rainier N.P.	0	0	160	0	0
Washington areas	3,040	480	54,840	1,230	9,280
Regional total	3,520	480	54,840	1,230	9,280

1/ N.F., National Forest, N.P., National Park.

Table 34.--Extent of silver fir beetles infestations in Washington in 1965, by reporting area and intensity of infestation

Reporting area[1/]	Infestation centers	Intensity of infestation: Light	Moderate	Heavy	Very heavy	All intensities
	Number	Acres				
Washington:						
Mt. Baker N.F.	27	1,860	2,600	760	440	5,660
Olympic N.F.	7	1,200	200	0	0	1,400
Snoqualmie N.F.	6	580	520	0	160	1,260
Olympic N.P.	4	760	160	0	0	920
Washington areas	44	4,400	3,480	760	600	9,240
Regional total	44,	4,400	3,480	760	600	9,240

1/ N.F., National Forest; N.P., National Park.

OTHER FOREST PROBLEMS

DYING HEMLOCK

No dying hemlock was recorded in Oregon this year and the extent and intensity of damage in Washington was substantially reduced (table 35). Continuing damage centers occurred on the Mt. Baker and Olympic National Forests and Olympic National Park in Washington (table 36). Lighter scattered damage occurred on or near the Snoqualmie National Forest and Northwest and Southwest Washington.

Prompt salvage of the merchantable dead and dying hemlock is continuing in an attempt to save timber values that might otherwise be lost to decays.

Table 35.--Trend of dying hemlock in Oregon and Washington, 1961-65

(In acres)

Reporting area[1/]	Year				
	1961	1962	1963	1964	1965
Oregon:					
Northwest Oregon Dist.	480	0	3,820	0	0
Siuslaw N.F.	0	1,280	0	0	0
Oregon areas	480	1,280	3,820	0	0
Washington:					
Mt. Baker N.F.	143,320	79,340	42,760	115,340	57,690
Olympic N.F.	122,240	60,800	80,720	60,830	16,040
Olympic N.P.	66,400	69,600	32,480	21,450	5,200
Snoqualmie N.F.	5,120	10,100	2,560	0	2,480
Southwest Washington Dist.	13,760	3,840	0	0	2,080
Northwest Washington Dist.	0	0	0	5,840	2,000
Gifford Pinchot N.F.	1,880	0	0	0	0
Quinault I.R.	320	0	1,800	0	0
Washington areas	353,040	223,680	160,320	203,460	85,490
Regional total	353,520	224,960	164,140	203,460	85,490

1/ N.F., National Forest; N.P., National Park; I.R., Indian Reservation.

Table 36.--Extent of dying hemlock in Washington in 1965, by reporting area and intensity of damage

Reporting area[1/]	Damage centers	Intensity of damage: Light	Moderate	Heavy	Very heavy	All intensities
	Number	Acres				
Washington:						
Mt. Baker N.F.	38	19,560	22,410	13,160	2,560	57,690
Olympic N.F.	15	10,600	4,760	680	0	16,040
Olympic N.P.	6	920	4,280	0	0	5,200
Snoqualmie N.F.	3	2,480	0	0	0	2,480
Southwest Washington Dist.	3	2,080	0	0	0	2,080
Northwest Washington Dist.	3	2,000	0	0	0	2,000
Washington area	68	37,640	31,450	13,840	2,560	85,490
Regional total	68	37,640	31,450	13,840	2,560	85,490

1/ N.F., National Forest; N.P., National Park.

TREE DAMAGE BY BEARS

Tree damage and killing caused by bears increased slightly in Washington and decreased significantly in Oregon Forests (table 37). The heaviest and most severe damage centers in Washington were on or near the Olympic and Gifford Pinchot National Forests (table 38). Lighter, but significant damage was recorded in the Southwestern Washington area and on or near the Snoqualmie National Forest. Oregon losses or damage were centered on the Northwest Oregon reporting area (table 38). Minor losses also occurred on or near the Siuslaw and Willamette National Forests.

From 1961 to 1965 bears have killed about 30 percent of the total growing stock on sample plots on the Gifford Pinchot National Forest in Washington. These losses further reduce the stocking and yield on already understocked areas.

Table 37.--Trend of bear damage in Oregon and and Washington, 1961-65

(In acres)

Reporting area[1/]	Year				
	1961	1962	1963	1964	1965
Oregon:					
Northwest Oregon Dist.	51,200	42,920	32,610	37,770	10,330
Siuslaw N.F.	19,440	28,300	27,810	7,100	3,410
Willamette N.F.	44,800	26,200	2,250	7,200	2,100
Mt. Hood N.F.	10,480	12,280	2,720	960	1,510
Umpqua N.F.	0	0	150	180	0
Siskiyou N.F.	3,520	0	0	80	0
Rogue River N.F.	480	0	0	0	0
Oregon areas	129,920	109,700	65,540	53,290	17,350
Washington:					
Olympic N.F.	80,700	21,760	59,800	32,390	30,320
Gifford Pinchot N.F.	9,580	960	36,620	19,220	26,440
Southwest Washington	13,280	800	34,560	12,390	12,200
Snoqualmie N.F.	7,920	520	18,730	6,760	10,420
Quinault I.R.	1,920	3,360	360	2,280	560
Olympic N.P.	0	0	0	0	380
Puget Sound Dist.	0	0	0	0	260
Yakima I.R.	0	0	0	240	0
Washington areas	113,400	27,400	150,070	73,280	80,580
Regional total	243,320	137,100	215,610	126,570	97,930

1/ N.F., National Forest; I.R., Indian Reservation; N.P., National Park.

Table 38.--Extent of tree damage caused by bears in Oregon and Washington in 1965, by reporting area and intensity of damage

Reporting area[1/]	Damage centers	Intensity of damage: Light	Moderate	Heavy	Very heavy	All intensities
	Number	Acres				
Oregon:						
Northwest Oregon Dist.	44	5,770	4,560	0	0	10,330
Siuslaw N.F.	30	2,170	640	600	0	3,410
Willamette N.F.	17	1,840	260	0	0	2,100
Mt. Hood N.F.	21	1,330	180	0	0	1,510
Oregon areas	112	11,110	5,640	600	0	17,350
Washington:						
Olympic N.F.	71	18,000	8,360	3,960	0	30,320
Gifford Pinchot N.F.	28	16,940	8,200	1,300	0	26,440
Southwest Washington Dist.	35	6,000	3,280	2,360	560	12,200
Snoqualmie N.F.	28	5,460	2,120	2,080	760	10,420
Quinault I.R.	1	560	0	0	0	560
Olympic N.P.	3	260	120	0	0	380
Puget Sound Dist.	3	80	180	0	0	260
Washington areas	169	47,300	22,260	9,700	1,320	80,580
Regional total	281	58,410	27,900	10,300	1,320	97,930

1/ N.F., National Forest; I.R., Indian Reservation; N.P., National Park.

APPENDIX

Aerial Surveys

Aerial surveys were coordinated by the U. S. Forest Service in cooperation with Oregon State Department of Forestry and Washington State Department of Natural Resources. Larch casebearer surveys in northeastern Washington were made in early June. Regular detection surveys were made between July and September. Douglas-fir beetle evaluation surveys were flown in September. Flying time for surveys this year totaled 321.1 hours (table 39).

Managing foresters accompanied the regular survey crews on the flights over their respective areas to gain a better understanding of their forest pest problems.

Table 39.--Summary of cooperative aerial survey activities in 1965

Area covered	Timber area surveyed	Survey flight time		
		Mapping	Ferry	Total
	M acres	Hours		
Western Oregon	15,858	68.3	12.2	80.5
Eastern Oregon	14,881	67.8	19.7	87.5
Western Washington	13,061	45.5	23.7	69.2
Eastern Washington	9,989	72.2	11.7	83.9
All areas	53,789	253.8	67.3	321.1

Table 40.--Extent of infestations in Oregon in 1965, by forest area, insect species, and intensity of infestation

Reporting area and insects involved 1/ 2/	Infestation centers	Intensity of infestation: Light	Moderate	Heavy	Very heavy	All intensities
	Number	Acres				
Central Oregon District and adjacent forest lands:						
Mountain pine beetle (P)	9	680	0	0	0	680
Western pine beetle	7	440	0	0	0	440
Oregon pine ips	4	160	0	0	0	160
Fir engraver	6	110	40	0	0	150
All insects	26	1,390	40	0	0	1,430
Coos District and adjacent forest lands:						
Douglas-fir beetle	664	29,080	21,680	17,040	1,920	69,720
Balsam woolly aphid	5	0	360	280	0	640
Mountain pine beetle (S)	2	160	0	0	0	160
All insects	671	29,240	22,040	17,320	1,920	70,520

See footnotes at end of table.

Table 40.--Extent of infestations in Oregon in 1965 ... (Continued)

Reporting area and insects involved 1/ 2/	Infestation centers	Intensity of infestation: Light	Moderate	Heavy	Very heavy	All intensities
	Number	Acres				
Crater Lake N.P.:						
Balsam woolly aphid	17	1,790	900	660	0	3,350
Mountain pine beetle (W)	9	1,000	800	0	0	1,800
Fir engraver	1	10	0	0	0	10
All insects	27	2,800	1,700	660	0	5,160
Deschutes N.F. and adjacent forest lands:						
Mountain pine beetle (L)	44	7,360	2,600	1,770	200	11,930
Balsam woolly aphid	61	4,860	400	0	0	5,260
Needle miner, lodgepole pine	3	1,440	3,520	0	0	4,960
Western pine beetle	47	4,510	270	0	0	4,780
Pine needle scale	1	0	4,640	0	0	4,640
Mountain pine beetle (P)	18	1,240	1,310	0	0	2,550
Oregon pine ips	17	470	480	0	0	950
Mountain pine beetle (W)	4	140	90	0	0	230
Fir engraver	3	60	0	0	0	60
Mountain pine beetle (S)	1	50	0	0	0	50
All insects	199	20,130	13,310	1,770	200	35,410

See footnotes at end of table.

Table 40.--Extent of infestations in Oregon in 1965 ... (Continued)

Reporting area and insects involved 1/ 2/	Infestation centers	Intensity of infestation: Light	Moderate	Heavy	Very heavy	All intensities
	Number	Acres				
Fremont N.F. and adjacent forest lands:						
Mountain pine beetle (L)	101	18,920	17,020	8,780	2,380	47,100
Western pine beetle	119	20,000	7,100	3,660	0	30,760
Mountain pine beetle (P)	104	8,520	5,600	2,460	160	16,740
Fir engraver	22	2,680	1,820	760	0	5,260
Douglas-fir tussock moth	2	1,760	360	0	0	2,120
Mountain pine beetle (S)	6	1,640	0	0	0	1,640
Oregon pine ips	5	170	0	0	0	170
All insects	359	53,690	31,900	15,660	2,540	103,790
Malheur N.F. and adjacent forest lands:						
Mountain pine beetle (P)	106	21,300	5,610	2,260	0	29,170
Western pine beetle	183	23,340	3,310	120	0	26,770
Mountain pine beetle (L)	25	4,780	2,240	1,390	0	8,410
Douglas-fir beetle	49	5,760	400	0	0	6,160
Fir engraver	57	5,070	330	0	0	5,400
Oregon pine ips	37	2,240	1,880	240	0	4,360
Douglas-fir tussock moth	9	2,170	420	200	0	2,790
All insects	466	64,660	14,190	4,210	0	83,060

See footnotes at end of table.

Table 40.--Extent of infestations in Oregon in 1965...(Continued)

Reporting area and insects involved [1/] [2/]	Infestation centers	Intensity of infestation: Light	Moderate	Heavy	Very heavy	All intensities
	Number	Acres				
Mt. Hood N.F. and adjacent forest lands:						
Mountain pine beetle (W)	182	9,330	8,620	8,360	1,500	27,810
Balsam woolly aphid	50	7,370	160	0	0	7,530
Larch sawfly	3	6,200	1,240	90	0	7,530
Douglas-fir beetle	11	400	0	0	0	400
Fir engraver	8	270	0	0	0	270
Oregon pine ips	7	40	30	0	0	70
Western pine beetle	3	60	0	0	0	60
Mountain pine beetle (P)	3	50	0	0	0	50
All insects	267	23,720	10,050	8,450	1,500	43,720
Bear damage	21	1,330	180	0	0	1,510
All damage	288	25,050	10,230	8,450	1,500	45,230

See footnotes at end of table.

Table 40.--Extent of infestations in Oregon in 1965 ... (Continued)

Reporting area and insects involved 1/ 2/	Infestation centers	Intensity of infestation: Light	Moderate	Heavy	Very heavy	All intensities
	Number	Acres				
Northwest Oregon Dist. and adjacent forest lands:						
Douglas-fir beetle	16	1,400	0	0	0	1,400
All insects	16	1,400	0	0	0	1,400
Bear damage	44	5,770	4,560	0	0	10,330
All damage	60	7,170	4,560	0	0	11,730
Ochoco N.F. and adjacent forest lands:						
Western pine beetle	89	14,760	0	0	0	14,760
Fir engraver	51	5,790	2,980	0	0	8,770
Oregon pine ips	40	3,360	230	140	0	3,730
Mountain pine beetle (P)	19	2,370	0	0	0	2,370
Douglas-fir beetle	4	550	0	0	0	550
Mountain pine beetle (L)	1	40	0	0	0	40
All insects	204	26,870	3,210	140	0	30,220

See footnotes at end of table.

Table 40.--Extent of infestations in Oregon in 1965... (Continued)

Reporting area and insects involved 1/ 2/	Infestation centers	Intensity of infestation: Light	Moderate	Heavy	Very heavy	All intensities
	Number	Acres				
Rogue River N.F. and adjacent forest lands:						
Balsam woolly aphid	27	3,290	770	80	0	4,140
Douglas-fir beetle	55	2,370	210	0	0	2,580
Western pine beetle	15	1,160	40	0	0	1,200
Mountain pine beetle (W)	17	640	280	0	0	920
Oregon pine ips	9	420	0	0	0	420
Fir engraver	7	270	0	0	0	270
Mountain pine beetle (P)	5	170	0	0	0	170
Mountain pine beetle (S)	3	130	0	0	0	130
All insects	138	8,450	1,300	80	0	9,830

See footnotes at end of table.

Table 40.--Extent of infestations in Oregon in 1965 ... (Continued)

Reporting area and insects involved[1/ 2/]	Infestation centers	Intensity of infestation: Light	Moderate	Heavy	Very heavy	All intensities
	Number	Acres				
Siskiyou N.F. and adjacent forest lands:						
Douglas-fir beetle	208	10,270	3,890	1,040	0	15,200
Mountain pine beetle (S)	37	3,750	360	0	0	4,110
Mountain pine beetle (W)	10	720	960	0	0	1,680
Western pine beetle	8	1,350	0	0	0	1,350
Mountain pine beetle (P)	11	1,290	0	0	0	1,290
Oregon pine ips	5	270	0	0	0	270
Mountain pine beetle (L)	1	80	0	0	0	80
All insects	280	17,730	5,210	1,040	0	23,980
Siuslaw N.F. and adjacent forest lands:						
Douglas-fir beetle	568	27,210	15,070	11,400	400	54,080
Western oak looper	3	80	640	0	0	720
All insects	571	27,290	15,710	11,400	400	54,800
Bear damage	30	2,170	640	600	0	3,410
All damage	601	29,460	16,350	12,000	400	58,210

See footnotes at end of table.

Table 40.--Extent of infestations in Oregon in 1965 ... (Continued)

Reporting area and insects involved 1/ 2/	Infestation centers	Intensity of infestation: Light	Moderate	Heavy	Very heavy	All intensities
	Number	Acres				
Umatilla I.R.:						
Fir engraver	5	530	0	0	0	530
Oregon pine ips	1	30	0	0	0	30
Mountain pine beetle (P)	2	20	0	0	0	20
All insects	8	580	0	0	0	580
Umatilla N.F. and adjacent forest lands:						
Fir engraver	176	19,290	2,910	0	0	22,200
Western pine beetle	44	4,430	450	0	0	4,880
Mountain pine beetle (P)	23	2,720	420	0	0	3,140
Douglas-fir beetle	21	1,900	0	0	0	1,900
Engelmann spruce beetle	5	190	0	0	0	190
Mountain pine beetle (L)	3	140	0	0	0	140
Oregon pine ips	4	110	0	0	0	110
All insects	276	28,780	3,780	0	0	32,560

See footnotes at end of table.

Table 40.--Extent of infestations in Oregon in 1965 ... (Continued)

Reporting area and insects involved 1/ 2/	Infestation centers	Intensity of infestation: Light	Moderate	Heavy	Very heavy	All intensities
	Number	Acres				
Umpqua N.F. and adjacent forest lands:						
Douglas-fir beetle	374	23,180	5,520	1,560	0	30,260
Balsam woolly aphid	25	3,440	800	80	0	4,320
Mountain pine beetle (W)	30	2,120	800	0	0	2,920
Mountain pine beetle (K)	3	1,400	0	0	0	1,400
Mountain pine beetle (P)	1	120	0	0	0	120
All insects	433	30,260	7,120	1,640	0	39,020
Wallowa-Whitman N.F. and adjacent forest lands:						
Mountain pine beetle (P)	134	28,290	8,920	7,570	3,630	48,410
Douglas-fir beetle	215	18,520	2,110	80	0	20,710
Fir engraver	160	16,060	3,250	0	0	19,310
Engelmann spruce beetle	53	5,860	1,080	280	0	7,220
Western pine beetle	57	6,410	0	0	0	6,410
Oregon pine ips	36	3,060	240	520	0	3,820
Mountain pine beetle (L)	12	1,370	1,080	680	0	3,130
All insects	667	79,570	16,680	9,130	3,630	109,010

See footnotes at end of table.

Table 40.--Extent of infestations in Oregon in 1965 ... (Continued)

Reporting area and insects involved 1/ 2/	Infestation centers	Intensity of infestation: Light	Moderate	Heavy	Very heavy	All intensities
	Number	Acres				
Warm Springs I.R.:						
Larch sawfly	5	5,710	2,740	960	0	9,410
Balsam woolly aphid	16	1,230	520	0	0	1,750
Western pine beetle	9	1,480	0	0	0	1,480
Oregon pine ips	6	90	40	0	0	130
Mountain pine beetle (W)	4	80	0	0	0	80
Douglas-fir beetle	3	50	0	0	0	50
All insects	43	8,640	3,300	960	0	12,900
Willamette N.F. and adjacent forest lands:						
Mountain pine beetle (W)	148	18,980	13,620	5,640	0	38,240
Balsam woolly aphid	115	13,510	4,740	1,180	0	19,430
Douglas-fir beetle	197	15,320	1,570	960	0	17,850
All insects	460	47,810	19,930	7,780	0	75,520
Bear damage	17	1,840	260	0	0	2,100
All damage	477	49,650	20,190	7,780	0	77,620

See footnotes at end of table.

Table 40.--Extent of infestation in Oregon in 1965 ... (Continued)

Reporting area and insects involved 1/ 2/	Infestation centers	Intensity of infestation: Light	Moderate	Heavy	Very Heavy	All intensities
	Number	Acres				
Winema N.F. and adjacent forest lands:						
Mountain pine beetle (L)	93	17,130	3,690	740	0	21,560
Western pine beetle	82	10,850	480	380	0	11,710
Mountain pine beetle (P)	37	4,350	560	0	0	4,910
Oregon pine ips	25	1,260	520	0	0	1,780
Fir engraver	19	1,450	120	0	0	1,570
Mountain pine beetle (W)	3	240	0	0	0	240
Mountain pine beetle (S)	1	20	0	0	0	20
All insects	260	35,300	5,370	1,120	0	41,790

1/ Mountain pine beetle damage has been separated by tree species attacked: L, lodgepole pine; P, ponderosa pine; W, western white pine; K, knobcone pine; S, sugar pine.

2/ Administrative areas are abbreviated as follows: N.F., National Forest; I.R., Indian Reservation; N.P., National Park.

Table 41.--Extent of infestations in Washington in 1965, by forest area, insect species, and intensity of infestation

Reporting area and insects involved 1/ 2/	Infestation centers	Intensity of infestation: Light	Moderate	Heavy	Very heavy	All intensities
	Number	Acres				
Colville I.R.:						
Western pine beetle	10	3,080	280	0	0	3,360
Douglas-fir beetle	12	2,040	260	0	0	2,300
Larch casebearer	1	0	0	0	1,120	1,120
Mountain pine beetle (P)	4	620	0	390	0	1,010
Fir engraver	3	210	280	0	0	490
Oregon pine ips	4	80	160	80	0	320
All insects	34	6,030	980	470	1,120	8,600
Colville N.F. and adjacent forest lands:						
Larch casebearer	32	9,870	5,490	1,820	0	17,180
Mountain pine beetle (W)	13	2,920	620	5,460	280	9,280
Douglas-fir beetle	52	5,600	2,520	420	240	8,780
Mountain pine beetle (P)	13	280	1,500	1,140	360	3,280
Fir engraver	15	1,840	740	0	0	2,580
Western pine beetle	6	1,760	0	0	0	1,760
Oregon pine ips	2	40	100	0	0	140
All insects	133	22,310	10,970	8,840	880	43,000

See footnotes at end of table.

Table 41.--Extent of infestations in Washington in 1965 ... (Continued)

Reporting area and insects involved [1/] [2/]	Infestation centers	Intensity of infestation: Light	Moderate	Heavy	Very heavy	All intensities
	Number	Acres				
Gifford Pinchot N.F. and adjacent forest lands:						
Mountain pine beetle (W)	31	10,140	2,550	100	80	12,870
Balsam woolly aphid	36	8,910	1,980	150	0	11,040
Douglas-fir beetle	9	2,710	220	0	0	2,930
Fir engraver	1	0	0	100	0	100
All insects	77	21,760	4,750	350	80	26,940
Bear damage	28	16,940	8,200	1,300	0	26,440
All damage	105	38,700	12,950	1,650	80	53,380
Glenwood District and adjacent forest lands:						
Mountain pine beetle (W)	2	600	560	0	0	1,160
Western pine beetle	7	940	0	0	0	940
Douglas-fir beetle	4	280	0	0	0	280
Oregon pine ips	1	60	0	0	0	60
Mountain pine beetle (P)	1	40	0	0	0	40
All insects	15	1,920	560	0	0	2,480

See footnotes at end of table.

Table 41.--Extent of infestations in Washington in 1965 ... (Continued)

Reporting area and insects involved 1/ 2/	Infestation centers	Intensity of infestation: Light	Moderate	Heavy	Very heavy	All intensities
	Number	Acres				
Kaniksu N.F. and adjacent forest lands:						
Larch casebearer	10	88,340	50,390	22,070	6,680	167,480
Mountain pine beetle (W)	15	2,200	1,000	280	0	3,480
Fir engraver	2	160	120	0	0	280
Douglas-fir beetle	2	80	0	100	0	180
All insects	29	90,780	51,510	22,450	6,680	171,420
Mt. Baker N.F. and adjacent forest lands:						
Silver fir beetles	27	1,860	2,600	760	440	5,660
Mountain pine beetle (W)	10	1,440	0	0	0	1,440
Douglas-fir beetle	3	160	0	0	0	160
All insects	40	3,460	2,600	760	440	7,260
Dying hemlock	38	19,560	22,410	13,160	2,560	57,690
All damage	78	23,020	25,010	13,920	3,000	64,950

See footnotes at end of table.

Table 41.--Extent of infestations in Washington in 1965 ... (Continued)

Reporting area and insects involved 1/ 2/	Infestation centers	Intensity of infestation: Light	Moderate	Heavy	Very heavy	All intensities
	Number	Acres				
Mt. Rainier N.P.:						
Mountain pine beetle (W)	7	800	840	280	0	1,920
Balsam woolly aphid	2	120	0	240	0	360
All insects	9	920	840	520	0	2,280
Northeast Washington District and adjacent forest lands:						
Larch casebearer	53	102,610	27,150	14,660	6,740	151,160
Douglas-fir tussock moth	9	820	660	1,100	0	2,580
Western pine beetle	3	200	80	0	0	280
Oregon pine ips	3	160	0	0	0	160
Douglas-fir beetle	1	120	0	0	0	120
All insects	69	103,910	27,890	15,760	6,740	154,300

See footnotes at end of table.

Table 41.--Extent of infestations in Washington in 1965 ... (Continued)

Reporting area and insects involved 1/ 2/	Infestation centers	Intensity of infestation: Light	Moderate	Heavy	Very heavy	All intensities
	Number	Acres				
Northwest Washington District and adjacent forest lands:						
Douglas-fir beetle	1	40	0	0	0	40
All insects	1	40	0	0	0	40
Dying hemlock	3	2,000	0	0	0	2,000
All damage	4	2,040	0	0	0	2,040
Okanogan N.F. and adjacent forest lands:						
Mountain pine beetle (P)	31	3,540	6,480	3,900	1,480	15,400
Douglas-fir beetle	58	7,720	3,080	1,360	0	12,160
Western pine beetle	18	3,320	320	0	0	3,640
Fir engraver	14	1,640	920	440	200	3,200
Mountain pine beetle (W)	6	480	360	0	0	840
Oregon pine ips	7	440	360	0	0	800
Mountain pine beetle (L)	5	200	120	120	0	440
Engelmann spruce beetle	2	60	320	0	0	380
All insects	141	17,400	11,960	5,820	1,680	36,860

See footnotes at end of table.

Table 41.--Extent of infestations in Washington in 1965 ... (Continued)

Reporting area and insects involved 1/ 2/	Infestation centers	Intensity of infestation: Light	Moderate	Heavy	Very heavy	All intensities
	Number	Acres				
Olympic N.F. and adjacent forest lands:						
Mountain pine beetle (W)	25	5,440	920	1,120	480	7,960
Silver fir beetles	7	1,200	200	0	0	1,400
Douglas-fir beetle	6	440	0	0	0	440
Green spruce aphid	1	240	0	0	0	240
Mountain pine beetle (L)	1	80	0	0	0	80
All insects	40	7,400	1,120	1,120	480	10,120
Bear damage	71	18,000	8,360	3,960	0	30,320
Dying hemlock	15	10,600	4,760	680	0	16,040
All damage	126	36,000	14,240	5,760	480	56,480
Olympic N.P.:						
Mountain pine beetle (W)	71	16,040	8,540	1,680	680	26,940
Silver fir beetles	4	760	160	0	0	920
Green spruce aphid	1	720	0	0	0	720
Douglas-fir beetle	1	80	0	0	0	80
All insects	77	17,600	8,700	1,680	680	28,660
Dying hemlock	6	920	4,280	0	0	5,200
Bear damage	3	260	120	0	0	380
All damage	86	18,780	13,100	1,680	680	34,240

See footnotes at end of table.

Table 41.--Extent of infestations in Washington in 1965 ... (Continued)

Reporting area and insects involved 1/ 2/	Infestation centers	Intensity of infestation: Light	Moderate	Heavy	Very heavy	All intensities
	Number	Acres				
Puget Sound District and adjacent forest lands:						
Mountain pine beetle (W)	2	0	560	160	0	720
Douglas-fir beetle	3	440	0	0	0	440
All insects	5	440	560	160	0	1,160
Bear damage	3	80	180	0	0	260
All damage	8	520	740	160	0	1,420
Quinault I.R.:						
Mountain pine beetle (W)	4	4,920	400	0	0	5,320
All insects	4	4,920	400	0	0	5,320
Bear damage	1	560	0	0	0	560
All damage	5	5,480	400	0	0	5,880

See footnotes at end of table.

Table 41.--Extent of infestations in Washington ... (Continued)

Reporting area and insects involved[1/ 2/]	Infestation centers	Intensity of infestation: Light	Moderate	Heavy	Very heavy	All intensities
	Number	Acres				
Snoqualmie N.F. and adjacent forest lands:						
Mountain pine beetle (W)	56	5,380	5,260	1,080	240	11,960
Balsam woolly aphid	24	4,480	1,080	1,280	960	7,800
Douglas-fir beetle	19	930	810	520	0	2,260
Silver fir beetles	6	580	520	0	160	1,260
Western pine beetle	6	580	600	0	0	1,180
Mountain pine beetle (P)	1	0	280	0	0	280
All insects	112	11,950	8,550	2,880	1,360	24,740
Bear damage	28	5,460	2,120	2,080	760	10,420
Dying hemlock	3	2,480	0	0	0	2,480
All damage	143	19,890	10,670	4,960	2,120	37,640

See footnotes at end of table.

Table 41.--Extent of infestations in Washington in 1965 ... (Continued)

Reporting area and insects involved 1/ 2/	Infestation centers	Intensity of infestation: Light	Moderate	Heavy	Very heavy	All intensities
	Number	Acres				
Southwest Washington District and adjacent forest lands:						
Douglas-fir beetle	30	2,640	880	0	160	3,680
Balsam woolly aphid	3	980	0	0	0	980
All insects	33	3,620	880	0	160	4,660
Bear damage	35	6,000	3,280	2,360	560	12,200
Dying hemlock	3	2,080	0	0	0	2,080
All damage	71	11,700	4,160	2,360	720	18,940
Spokane I.R.:						
Larch casebearer	2	0	2,080	1,360	0	3,440
Western pine beetle	5	1,280	0	0	0	1,280
Oregon pine ips	1	320	0	0	0	320
Mountain pine beetle (P)	1	280	0	0	0	280
All insects	9	1,880	2,080	1,360	0	5,320

See footnotes at end of table.

Table 41.--Extent of infestations in Washington in 1965 ... (Continued)

Reporting area and insects involved 1/ 2/	Infestation centers	Intensity of infestation: Light	Moderate	Heavy	Very heavy	All intensities
	Number	Acres				
Umatilla N.F. and adjacent forest lands:						
Fir engraver	58	9,850	1,470	560	0	11,880
Mountain pine beetle (P)	21	3,940	340	0	0	4,280
Engelmann spruce beetle	5	310	0	0	0	310
Mountain pine beetle (L)	1	50	0	0	0	50
All insects	85	14,150	1,810	560	0	16,520
Wenatchee N.F. and adjacent forest lands:						
Mountain pine beetle (W)	125	16,780	12,460	7,940	3,340	40,520
Western pine beetle	17	4,200	960	0	0	5,160
Fir engraver	21	2,560	780	0	0	3,340
Engelmann spruce beetle	8	3,080	0	0	0	3,080
Douglas-fir beetle	10	1,120	0	0	0	1,120
Mountain pine beetle (L)	7	640	100	100	0	840
Oregon pine ips	2	0	340	0	400	740
Mountain pine beetle (P)	3	160	180	240	0	580
Balsam woolly aphid	1	240	0	0	0	240
All insects	194	28,780	14,820	8,280	3,740	55,620

See footnotes at end of table.

Table 41.--Extent of infestations in Washington in 1965 ... (Continued)

Reporting area and insects involved 1/ 2/	Infestation centers	Intensity of infestation: Light	Moderate	Heavy	Very heavy	All intensities
	Number	Acres				
Yakima I.R.:						
Western pine beetle	21	6,520	800	0	0	7,320
Mountain pine beetle (P)	6	1,040	4,660	680	400	6,780
Larch sawfly	2	4,320	0	320	0	4,640
Mountain pine beetle (W)	5	480	2,320	0	120	2,920
Mountain pine beetle (L)	2	560	0	0	0	560
Oregon pine ips	1	0	560	0	0	560
Balsam woolly aphid	2	80	0	320	0	400
Fir engraver	1	120	0	0	0	120
All insects	40	13,120	8,340	1,320	520	23,300

1/ Mountain pine beetle damage has been separated by tree species attacked: L, lodgepole pine; P, ponderosa pine; W, western white pine.

2/ Reporting areas are abbreviated as follows: N.F., National Forest; I.R., Indian Reservation; N.P., National Park.

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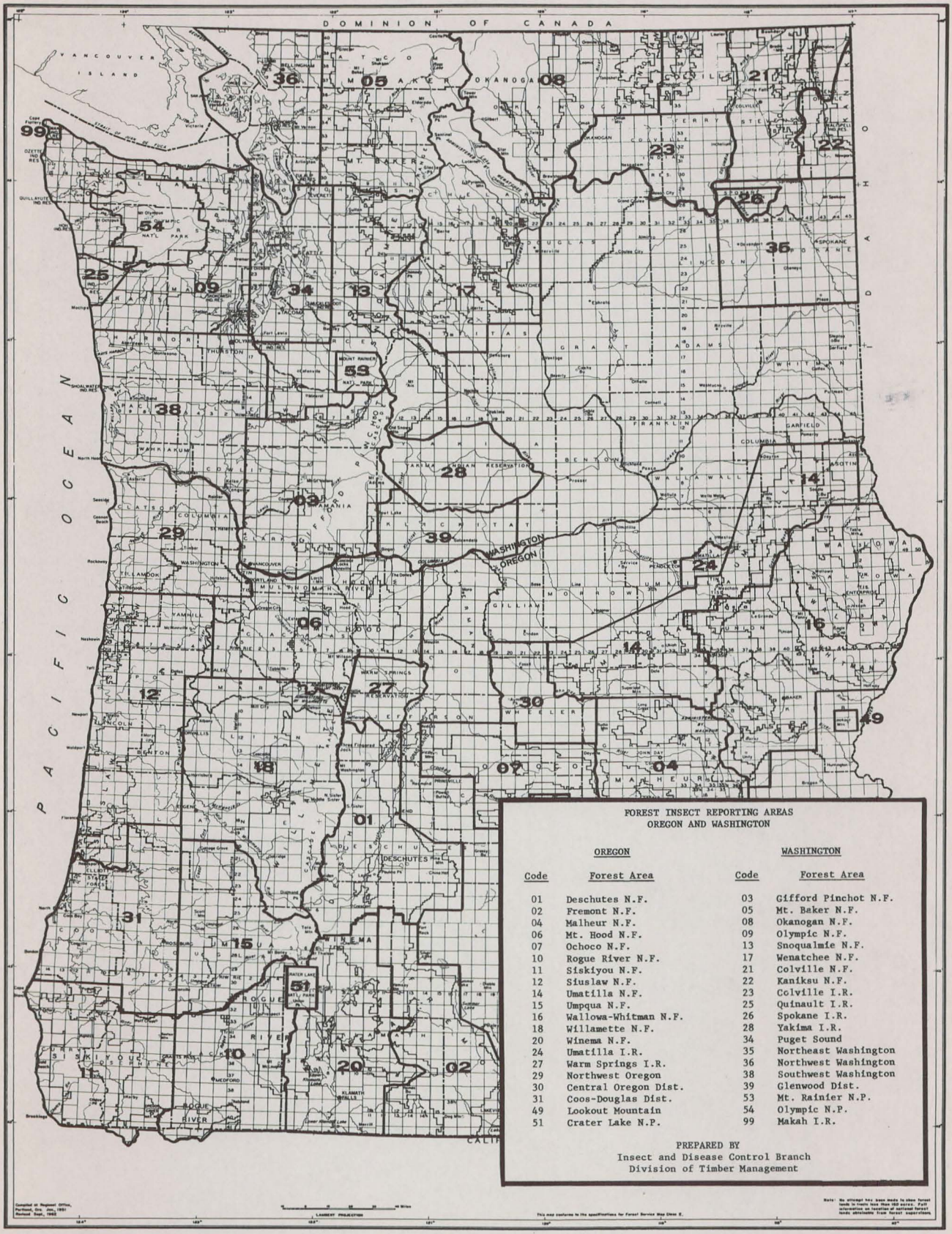

FOREST INSECT REPORTING AREAS
OREGON AND WASHINGTON

OREGON		WASHINGTON	
Code	Forest Area	Code	Forest Area
01	Deschutes N.F.	03	Gifford Pinchot N.F.
02	Fremont N.F.	05	Mt. Baker N.F.
04	Malheur N.F.	08	Okanogan N.F.
06	Mt. Hood N.F.	09	Olympic N.F.
07	Ochoco N.F.	13	Snoqualmie N.F.
10	Rogue River N.F.	17	Wenatchee N.F.
11	Siskiyou N.F.	21	Colville N.F.
12	Siuslaw N.F.	22	Kaniksu N.F.
14	Umatilla N.F.	23	Colville I.R.
15	Umpqua N.F.	25	Quinault I.R.
16	Wallowa-Whitman N.F.	26	Spokane I.R.
18	Willamette N.F.	28	Yakima I.R.
20	Winema N.F.	34	Puget Sound
24	Umatilla I.R.	35	Northeast Washington
27	Warm Springs I.R.	36	Northwest Washington
29	Northwest Oregon	38	Southwest Washington
30	Central Oregon Dist.	39	Glenwood Dist.
31	Coos-Douglas Dist.	53	Mt. Rainier N.P.
49	Lookout Mountain	54	Olympic N.P.
51	Crater Lake N.P.	99	Makah I.R.

PREPARED BY
Insect and Disease Control Branch
Division of Timber Management

Compiled at Regional Office, Portland, Ore. Jan., 1951
Revised Sept., 1962

LAMBERT PROJECTION

This map conforms to the specifications for Forest Service Map Class E.